Name: ______________________________ Date: ____________________

A2CC Review Q3 Exam 1

This review is not comprehensive. Be sure to review your notes, homework assignments, and old tests as well.

1. The quadratic function $f(x)$ has a turning point at $(5,-8)$. If $g(x)=f(x+7)-3$, then at which of the following does $g(x)$ have a turning point?

-7 -3

(-2, -11)

(1) $(-2,-11)$ (3) $(-7,-3)$

(2) $(12,-11)$ (4) $(12,-5)$

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2. Where does the absolute value function $y=\frac{1}{2}|x-8|+3$ have a turning point?

Vertical compression right 8 up 3

(1) $(-4,3)$ (3) $(8,3)$

(2) $(4,-3)$ (4) $(8,-3)$

$(0,0) \xrightarrow{\text{right 8}} (8,0) \xrightarrow{\text{vert comp.}} (8,0) \xrightarrow{\text{up 3}} (8,3)$

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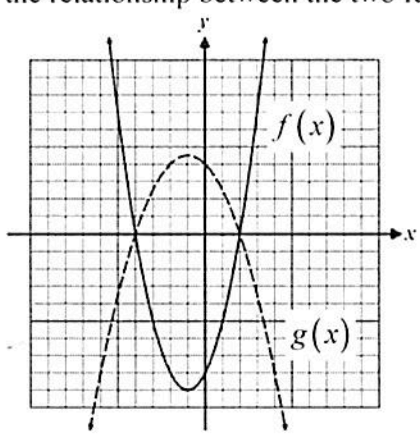
3. The function $f(x)$ is shown below graphed in solid while the function $g(x)$ is shown dashed. Which of the following equations describes the relationship between the two functions?

(1) $g(x)=f(x)-6$

(2) $g(x)=-\frac{1}{2}f(x)$

(3) $g(x)=2f(x)$

(4) $g(x)=f\left(\frac{1}{2}x\right)$



reflection over x-axis and a vertical compression

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4. Given that the function $y=x^2+6x-27$ has x-intercepts at $x=-9$ and $x=3$, where does the function $y=(3x)^2+6(3x)-27$ have x-intercepts?

(1) $x=\pm 6$ (3) $x=-27$ and $x=9$

(2) $x=-12$ and $x=0$ (4) $x=-3$ and $x=1$

$\frac{-9}{3}=-3$ $\frac{3}{3}=1$

Shows multiply by 3 so divide x-values by 3

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5. If the point $(-3, 7)$ lies on the graph of $f(x)$, then which of the following points must lie on the graph of $y = 5f(x) - 20$?

Vertical stretch by factor of 5 — down 20

$(-3,7) \longrightarrow (-3,35) \longrightarrow (-3,15)$

(1) $(-15, -13)$ (3) $(2, -13)$

(2) $(-3, 15)$ (4) $(1, 25)$

6. The range of the function $f(x)$ is $-4 \le y \le 10$. If $g(x) = -f(x) + 3$ then which of the following is the range for $g(x)$?

reflection over x-axis (switch signs) — up 3 (add 3)

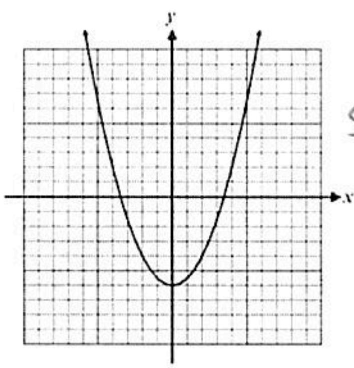
$-4 \le y \le 10$
$4 \ge y \ge -10$
$7 \ge y \ge -7$

(1) $-7 \le y \le 7$ (3) $-13 \le y \le 1$

(2) $5 \le y \le 15$ (4) $-3 \le y \le 8$

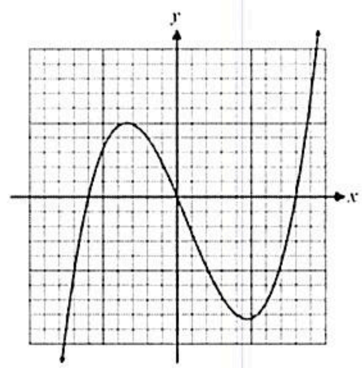
7. Which graph below shows an even function?

(1)

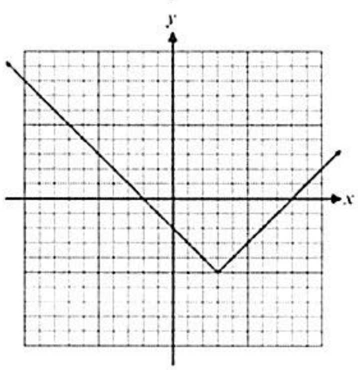


Symmetrical over y-axis

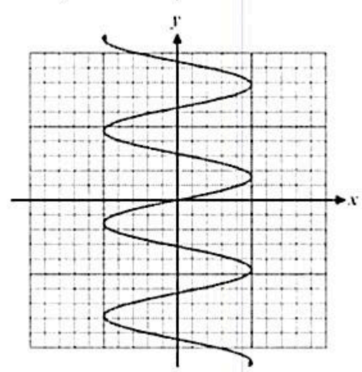
(3)



(2)



(4)



8. If $f(x)$ is an odd, one-to-one function with $f(5) = -2$ then which point *must* lie on the graph of its inverse, $f^{-1}(x)$?

$f(-5) = 2$

$f(x)$ has $(5,-2)$ $(-5,2)$ — $f^{-1}(x)$ has $(-2,5)$ $(2,-5)$

(1) $(5, -2)$ (3) $(-5, 2)$

(2) $(2, -5)$ (4) $(2, 5)$

$y = 3(x^2 - 8x + \boxed{16}) + 55 - \boxed{3(16)}$

9. The parabola $y = 3x^2 - 24x + 55$ can be written in the form

$\frac{-8}{2} = -4$

$(-4)^2 = 16$

$y = 3(x-4)^2 + 55 - 48$

$y = 3(x-4)^2 + 7$

(1) $y = 3(x-2)^2 + 2$ (3) $y = 3(x+2)^2 - 11$

(2) $y = 3(x-8)^2 + 55$ $\boxed{(4)\ y = 3(x-4)^2 + 7}$

Free Response

10. For the function $f(x)$ it is known that $(-12, 4)$ lies on the function. A second function, $g(x)$, is defined by the formula $g(x) = f(2x) - 3$.

Describe the transformations that occur to the graph of f in order to produce the graph of g.

(1) horizontal compression by a factor of 2

(2) Shift down 3

OR

(1) Multiply x by $\frac{1}{2}$

(2) Subtract 3 from y

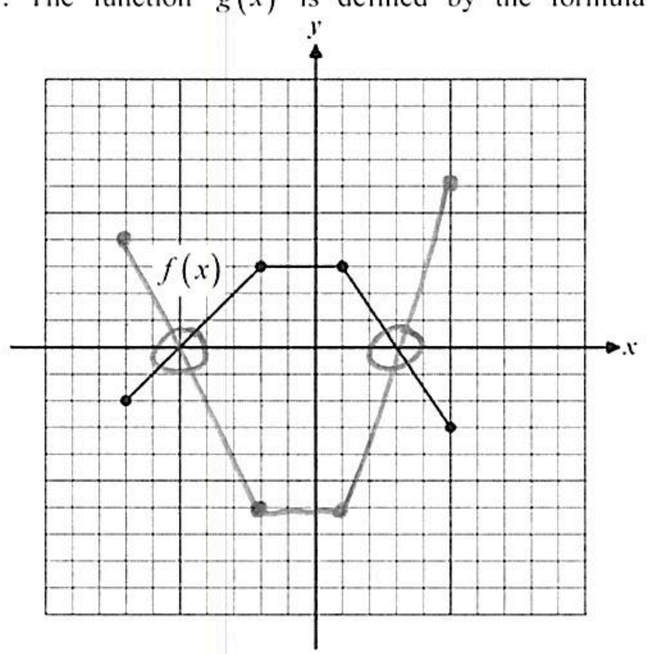
Based on the fact that the point $(-12, 4)$ lies on $f(x)$, what point must lie on $g(x)$?

$(-12, 4) \xrightarrow{\text{horizontal compression}} (-6, 4) \xrightarrow{\text{down 3}} \boxed{(-6, 1)}$

11. The graph of the function $f(x)$ is shown below. The function $g(x)$ is defined by the formula $g(x) = -2f(x)$ for all values of x.

Produce the graph of g on the same grid.

f(x)	g(x)
(-7,-2)	(-7,4)
(-2,3)	(-2,-6)
(1,3)	(1,-6)
(5,-3)	(5,6)



Solve the equation $f(x) = g(x)$ for all values of x.

They cross at

$x = -5$ and $x = 3$

12. The function $f(x)=\dfrac{x^4-8}{4x}$ is either an even function or an odd function. Provide evidence to support your answer.

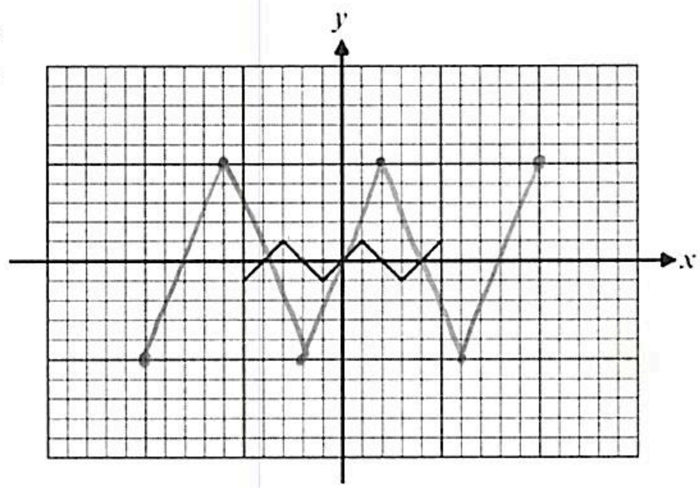
plug into calculator

x	y
-3	-73/12
-2	-1
-1	7/4
0	Error
1	-7/4
2	1
3	73/12

x switches sign and y switches sign therefore it is $\boxed{\text{ODD}}$

13. The graph of $f(x)$ is shown below. The function $g(x)$ is defined by $g(x)=5f\left(\dfrac{x}{2}\right)$.

Explain the transformations that will transform the graph of $f(x)$ into the graph of $g(x)$ and then produce it on the same grid.



① Horizontal stretch by a factor of 2 (multiply x-values by 2)

② Vertical stretch by a factor of 5 (multiply y-values by 5)

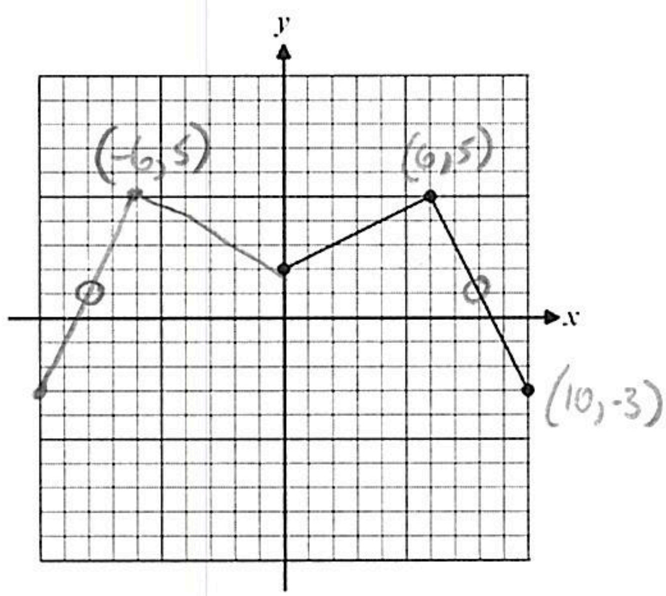
f(x)	g(x)	f(x)	g(x)
(-5,-1) →	(-10,-5)	(3,-1) →	(6,-5)
(-3,1)	(-6,5)	(5,1)	(10,5)
(-1,-1)	(-2,-5)		
(1,1)	(2,5)		

14. The function below shows the portion of the even function $f(x)$ for $x \geq 0$.

Sketch the portion of $f(x)$ for $x<0$.

x-values switch

y-values stay same



What value(s) of x solve the equation $f(x)=1$?

Where is the y-value = 1?

@ x = -8, 8

Does this function have an inverse that is also a function? Why or why not?

- No b/c f(x) is not 1 to 1
- f(x) does not pass the horizontal line test.

15. Given the parabola $f(x) = -(x-8)^2 + 5$, describe three transformations which would transform the graph of $y = x^2$ into the graph of $f(x)$. Give both the transformations and the order.

① Shift right 8

② Reflect over the x-axis

③ Shift up 5

16. Describe the difference between the transformations $f(-x)$ and $-f(x)$ on the graph of $f(x)$.

f(-x) is a reflection of f(x) over the y-axis

-f(x) is a reflection of f(x) over the x-axis

17. A function $g(x)$ has a domain of $-5 \le x \le 10$ and a range of $y \le 15$. If a new function is defined by $y = 5g(-x) + 3$, then what are its domain and range? Explain how you found your answer.

$-5 \le x \le 10$ $y \le 15$

reflect over y-axis → $5 \ge x \ge -10$ $y \le 75$ ← stretch by factor of 5

$-10 \le x \le 5$ $\boxed{y \le 78}$ ← up 3

18. Place the following quadratic function in $y = a(x-h)^2 + k$. Identify the coordinates of its turning point.

$-\frac{4}{2} = -2$ $(-2)^2 = 4$

$y = 3x^2 - 12x + 23$

$y = 3(x^2 - 4x + \boxed{4}) + 23 - \boxed{3(4)}$

$y = 3(x-2)^2 + 11$

$\boxed{(2, 11)}$

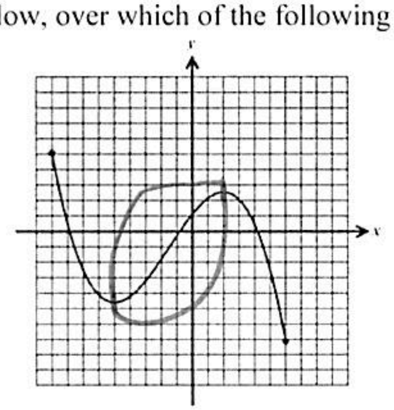
19. Given the function shown below, over which of the following intervals is the function always increasing?

(1) $0 < x < 5$

$\boxed{(2)\ -5 < x < 2}$

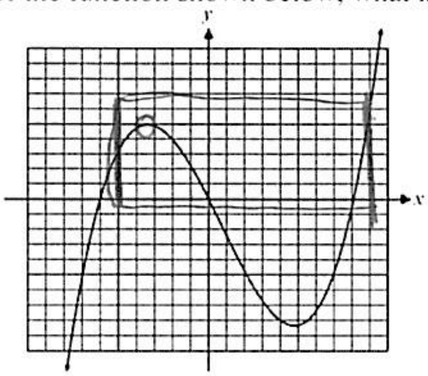
(3) $-1 < x < 4$

(4) $-9 < x < -5$



20. Given the graph of the function shown below, what is its maximum value of the interval $-5 \le x \le 9$?

$\boxed{(1)\ 5}$
(2) 6
(3) 3
(4) 10



21. Simplify the following (Be sure to indicate restrictions):

LCD: x^2

$$\frac{1+5x^{-1}-14x^{-2}}{x-4x^{-1}} = \frac{1+\frac{5}{x}-\frac{14}{x^2}}{x-\frac{4}{x}} = \frac{x^2+5x-14}{x^3-4x} = \frac{(x+7)\cancel{(x-2)}}{x(x+2)\cancel{(x-2)}}$$

rest: $x \ne 0, +2, -2$

$$= \boxed{\frac{x+7}{x(x+2)}}$$

22. Solve and express your solution on a number line and in set builder notation:

$$\frac{2x-4}{x+5} \ge 0$$

$2x-4=0$
$2x=4$
$x=2$
closed

$x+5=0$
$x=-5$
open

-5 Test 0 2

SB: $\{x \mid x<-5 \text{ or } x \ge 2\}$

23. Solve algebraically for x: $\dfrac{x}{2x+8}+\dfrac{2}{2x-8}=\dfrac{16}{x^2-16}$

$2(x+4)$ $\quad 2(x-4)$ $\quad (x+4)(x-4)$

LCD: $2(x+4)(x-4)$

$x \ne -4, 4$

$x(x-4)+2(x+4)=16(2)$
$x^2-4x+2x+8=32$
$x^2-2x+8=32$

$x^2-2x-24=0$
$(x-6)(x+4)=0$
$\boxed{x=6}$ $\quad x=-4$ reject (restriction)

24. Simplify the following and indicate all restrictions:

$x \ne -2, 2, -\frac{1}{2}, 1, -1, 3$

$(2x+1)(x+2)$ $\quad (x-3)(x-2)$ $\quad 2(x-3)(x+1)$

$$\frac{2x^2+5x+2}{x^2-4} \cdot \frac{x^2-5x+6}{4x+2} \div \frac{2x^2-4x-6}{4x^2+8x+4}$$

$(x+2)(x-2)$ $\quad 2(2x+1)$ $\quad 4(x+1)(x+1)$

$$= \frac{\cancel{(2x+1)}\cancel{(x+2)}}{\cancel{(x+2)}\cancel{(x-2)}} \cdot \frac{\cancel{(x-3)}\cancel{(x-2)}}{\cancel{2}\cancel{(2x+1)}} \cdot \frac{\cancel{4}^{2}(x+1)\cancel{(x+1)}}{\cancel{2}\cancel{(x-3)}\cancel{(x+1)}}$$

$\boxed{x+1}$